SYNOPSIS OF RESEARCH ENTITLED

Studies on Hydrobiological Aspects of Kundrala Medium Project, With Special Reference To its Productivity and Planktonic Diversity.

Submitted to

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED.

Submitted by

MS. JANHAVI RATNAKAR SHIURKAR.

Under Guidance of

DR.S.V.SHIVANIKAR.
Principal
Netaji Subhashchandra Bose College, Nanded.

Introduction:

The water covers about three quarters of our planet and yet it is sad to note down that about 70% of the world's populations survive without clean water. Next to air, the other important requirement for human life to exist in water. It is the nature's free gift to the human race. It is available in various forms such as rivers, lakes, streams etc. Importance of water in human life is so much that the development of any city of the world has taken place near some source of water supply.

The use of water by man, plants, and animals is universal. As a matter of fact every living soul requires water for its survival. It is essential for life, health and sanitation. The water when exposed to the atmosphere contained many impurities which are harmful to any living organism. If untreated water is consumed by living organisms, it is likely to cause serious harm to their health. Hence, in order to make water potable and free from various impurities the purification methods are found out. The source from which water is available for water supply scheme are of two types.

1. Surface source
2. Underground source.

   Surface water source include major rivers, lakes, ponds, streams, and storage reservoirs.

   Underground source is the most prime water that has percolated into the ground water and later on brought on surface by various methods or by techniques.

   The source of water supply whether surface or ground water are used for various purposes such as navigation, irrigation, or the surface water can also serve as a center of recreational activities such as bathing, boating, fishing, fountains etc.

Objectives:

Today the environmental quality is greatly focused on water because of its importance in maintaining the human health and health for ecosystem. Fresh water is finite resource essential for agriculture, industry and even human existence, without fresh water of adequate quantity and quality, sustainable development will not be possible.

The water required for public water supply schemes should be potable or wholesome water i.e. fit for drinking purpose. The impurities in water are to be removed to a certain extent only. So that it does not prove harmful to public health. The term wholesome water is used to indicate the water which is not chemically pure, but does not contain anything harmful to human health.

The objectives of research are as follows.

1. To analyse the qualitative aspects of water body physico chemically.
2. To evaluate the potability of the water body.
3. To conduct the status and various recreational use (swimming, boating, visual recreation, irrigation and agricultural use).
4. To find out the various phytoplanktons and Zooplanktons from the water body.
5. To determine the gross and net productivity of water body.

Study area:

The site selected for the Research work is Kundrala Medium Project. Kundrala is a village in Mukhed Taluka in Nanded District of Maharashtra State, India. It belongs to Marathwada region and Aurangabad Division. It is located 70kms towards South from District head quarters Nanded and 12kms from Mukhed. The purpose of Kundrala medium project is Irrigation as well as multipurpose i.e. drinking and other recreational use.

Kundrala dam is earthfill dam on local river/ Nallah. Main basin is Godavari and sub basin is Upper Godavari. The total catchment area is 86.25 sq.kms. The Gross Command Area GCA(Ha) is 1307, Culturable Command Area CCA(Ha) 1265, and Irrigable Command Area ICA(Ha) is 1012. The average annual rainfall near dam is 764mm and the annual Evaporation in mm3 is 3.65.

The height of the dam above lowest foundation is 18.5 m (61 ft) while the length is 999 m (3,278 ft). The volume content is 370 km^3 (89 cu mi) and gross storage capacity is 14,680.00 km^3 (3,521.92 cu mi).

Work Plan:

First year

First six months

1. Finalizing study area by conducting a primary survey.
2. Literature study for broadening research base.

Second six months

1. Analysis of samples and primary data collection
2. Literature review.

3. Analysis of primary data and interpretation.

Second year-

First six months

1. Analysis of samples and primary data collection
2. Literature review.
3. Preparation and publication of first research paper.

Second six months

1. Analysis of samples and primary data collection
2. Literature review.
3. Analysis of primary data and interpretation.

Third year-

First six months

1. Analysis of primary data generated.
2. Discussion on the statistical analysis of the research and conclusion.
3. Preparation and publication of second research paper.

Second six months

1. Finalizing the results drawn and conclusion.
2. Ph.D. Thesis writing.

Importance of Research work:

Water quality is fundamental for good river health. Water quality sustains ecological processes. Likewise, many of our own uses depend on water quality i.e. suitable for irrigation, watering stock, drinking, fishing and recreation, and to meet cultural and spiritual needs. The water quality objectives recognize the environmental values and uses for different waterways that the community want to see protected. These include

recreational use, healthy aquatic ecosystems, and water for drinking and irrigation. Water quality is closely linked to the surrounding environment and land use.

Following are the reasons for analysis of water.

1. To ascertain if the supplies maintain the required degree of purity and to find out the extent of any variation which occur.
2. To decide that, water obtained from such source of supply will be pure, wholesome not too hard and free from risk of any pollution.
3. To identify the organisms responsible for developing certain effects on water with respect to colour, taste, etc.
4. To know the characteristics of water at various sampling sites of water reservoir.
5. To suggest the probable remedies to control pollution.

Parameters:

The following parameters are to be analysed for assessing the water quality.

1. Physical parameters:

   COLOUR:-

   Even pure water is not colourless, it has got a pale green - blue tint in large volumes. Colour is a common constituent of many natural waters and it is caused by metallic substances such as iron and magnessium compounds, humic acid, humus materials fulvic acids, suspended matter, peat, tannins, algae, phytoplankons, weeds and protozoans. Industrial effluents also contribute colours to water supplies many industrial processes need virtually colourless waters only. Colour of water sample is to be noted by simple visual observation method.

   TEMPERATURE:-

   Measurement of water temperature is very important with regards to the aquatic life. It is an important factor for calculating solubility of oxygen and carbon di oxide etc. The multiplication of bacteria in water is more at higher temperatures. The temperature of drinking water has a direct influence on its taste. Temperature is an important parameter, which provides an idea of self purification of rivers, reservoirs and control of treatment plant.

   The simplest field method is to use a thermometer. The temperature of water is to be measured by thermometer on the sampling site and is recorded in ° C

HYDROGEN ION CONCENTRATION (pH):-

pH is the term used universally to express the intensity of acidic or alkaline condition of a solution. It is a measure of H +ve ion concentration or more precisely the hydrogen ion activity. Measurement of pH is one of the most important and frequently used tests in water chemistry. Practically every phase of the water supply and waste water treatment, e.g. acid base neutralization, water softening, precipitation, coagulation, disinfection and corrosion control, is pH dependent.

The pH of normal water is usually ranges from 6.5 to 8.5. Its value is largely governed by the carbon di oxide or bicarbonates or carbonate equilibrium. The alteration of pH of water is accompanied by changes in other physico chemical aspects of the medium.

The pH of water sample is recorded with the help of Digital pH meter. This is high quality precision instrument, designed especially for taking accurate pH estimation in chemical research and industries.

TURBIDITY:-

The colloidal matter present in the water interferes with passage of light and thus imparts turbidity to water. The turbidity in water may also be due to clay and silt particles discharge of sewage from domestic and industrial sources.

Turbidity is determined by Turbidity meter. The instrument consists of light source, cuvette holder and photovoltaic measuring system.

2. CHEMICAL PARAMETERS:

TOTAL DISSOLVED SOLIDS:-

Total dissolved solids denote mainly the various kinds of minerals present in the water or TDS can also be defined as the amount of nonvolatile substances present in colloidal and molecular dispersed states. However if some organic substances are present, as more often in polluted water, then they also contribute to the dissolved solids. Dissolved solids do not contain any gas and colloids. In natural water, dissolved solids are composed mainly of carbonates, bicarbonates, chlorides, sulphates, phosphates, nitrates of calcium, magnessium, iron etc. dissolved solids affect the quality of water by changing its taste due to dissolution of various salts. Dissolved solids also contain some foreign as well as soil particles that affect the human health.

The total dissolved solids of the water sample is determined as the residue left after evaporation of filtrate sample.

CHLORIDES:-

The chloride contents especially sodium chloride or salts generally occur in all types of water samples. In natural fresh waters, however its concentration remains quite low. Chloride is often a major inorganic constituent. The most important source of chloride in natural water is the discharge of sewage. Apart from this chloride results from the leaching of chloride containing rocks and soils with which the water comes in contact. Chlorides may impart some salty taste to the water, depending on the cation constituents. Some waters containing 280mg/lit may have typically salty taste. High chloride contents may harm metallic pipes and structures. High chlorides in irrigation water may be harmful to many land species.

The chloride contents of sample is to be determined by titration method using silver nitrate and potassium chromate indicator.

HARDNESS:-

Hardness is the property of water which prevents the lather formation with soap and increases the boiling point of water. There are two types of hardness. i.e. temporary hardness and permanent hardness. Temporary hardness can be removed by simple boiling but permanent hardness cannot be removed by boiling and requires special treatment. Temporary hardness is caused by bicarbonates and carbonates salts of ions where as permanent hardness is caused mainly by sulphates and chlorides of metals etc.

Hardness of sample is to be determined by EDTA Titration method using ammonium buffer and Erichrome black-T indicator.

PHOSPHATES:-

Phosphorus appears exclusively as ‘phosphate’ in aquatic environments. There are several forms of phosphates which may be present in aquatic systems in insoluble or particulate form. These include ortho-phosphates and organically bound phosphates. Phosphate is a constituent of soil and is used extensively in fertilizers to replace and or supplement natural quantities on agricultural lands. Phosphate is a constituent of animal waste and may become incorporated into soil in grazing and feeding areas.

Municipal waste water is another major source of phosphate in surface water. Other sources include industrial waste in which phosphate compounds are used for such purposes as boiler water conditioning. Phosphorous is not toxic, it is rather

essential for plant, animal life and does not represent any threat to the health of human or other organisms.

The phosphate of water sample is determined with the help of spectrophotometer. 50ml of sample is taken in a clear conical flask and to this added 2ml of ammonium molybdate followed by 5 drops of stannous chloride. A blue colour will appear and reading to be recorded to 690nm on spectrophotometer. This is high quality precision instrument.

SULPHATES:-

Sulphate is naturally occurring anion in all kinds of natural waters. In arid and semi arid region, it is found in particularly higher concentrations due to the accumulation of soluble salts in soils and shallow aquifers.

Rain water has quite high concentration of sulphates particularly in the area with high atmospheric pollution. Discharge in industrial wastes and domestic sewage in waters tends to increase its concentration. Most of the salts of sulphates are soluble in water and as such it is not precipitated. These sulphates impart hardness. The sulphates are to be determined with the help of spectrophotometer.

DISSOLVED OXYGEN:-

All living organisms are dependent upon oxygen in one form on the other to maintain the metabolic processes that produce energy for growth and reproduction. Aerobic processes are the subject of great interest for their need for free oxygen. Dissolved oxygen is also important in precipitation and dissolution of inorganic substances in water. Dissolved oxygen is very important parameter of water quality. The dissolved oxygen in water is depends on temperature because temperature is inversely proportional to dissolved oxygen. DO is determined by winkler's titration method, by using sodium thiosulphate and starch as an indicator.

BIOCHEMICAL OXYGEN DEMAND:-

Biochemical oxygen demand (BOD) is usually the amount of oxygen required by bacteria while stabilizing decomposable organic matter under aerobic condition. The term decomposable as the organic matter which can serve as food for the bacteria and energy from its oxidation. BOD can be estimated by Winkler's method. The BOD test is widely used to determine the polluting strength of domestic and industrial waste in terms of oxygen that will require its discharge into natural water bodies in which aerobic conditions exists.

3. Biological parameters:

PLANKTON STUDY:-

Planktons are floating living organisms found on the surface of fresh water. There are two types of planktons. A. phytoplanktons, B. zooplanktons. The phytoplanktons and zooplanktons are abundant in the shallow areas of the reservoirs, but only few species are abundant in the open water. The phytoplanktons and zooplanktons are to be observed under microscope on slide with the help of glycerine drop.

For Plankton counting in the water sample a device used is Sedgwick Rafter cell. The number of planktons counted in the cell will represent the total organisms present in the sample.

PRODUCTIVITY:-

Primary productivity is the process by which the inorganic materials of the environment are converted in to organic matter of cell. Primary production almost entirely depends on photosynthesis. In fresh water body the primary production is mainly depends on phytoplanktons. The rate of primary production is called as primary productivity. The primary productivity is determined by light and dark bottle method.

METHODOLOGY:

PARAMETERS	*METHOD*
1. Colour	Visual observation
2. Temperature	Mercury thermometer
3. Hydrogen ion concentration	pH meter
4. Turbidity	Turbidity meter
5. Total dissolved solids	Evaporation method
6. Chlorides	Titration method
7. Hardness	Titration method
8. Phosphates	Spectrophotometer
9. Sulphates	Spectrophotometer
10. Dissolved oxygen	Winkler's method
11. Biochemical Oxygen Demand	Winkler's method
12. Plankton study	Sedgwick Rafter cell
13. Productivity	Light and dark bottle

References:-

APHA(1976).

Standard methods for the examination of water and waste water including bottom sediments and sludges. Published by American Public Health Association(APHA),Inc., New York, 11th Ed.

Ansari M.A.(1993).

Hydrobiological Studies of Godavari Water at Nanded.

Ph.D. Thesis, Marathwada University, Aurangabad.

NEERI(1988).

Manual on water and waste water analysis.

NEERI Publication, Nagpur P.P.32

Trivedi R.K. and P.K. Goel(1984)

Chemical and biological methods for water pollution Studies,

Environmental Publications Karad , India,pp:22

S.C. Rangwala.(2003)

Water Supply And Sanitary Engineering(Environmental Engineering)

Charotar Publishing House, Anand, India.

STUDENT GUIDE